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The Chorionic Sculpture in Eggs of some Hadeninae (Lepidoptera, Noctuidae) from Ukraine

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Dolinskaya I. V. The chorionic sculpture in eggs of some Hadeninae (Lepidoptera, Noctuidae) from Ukraine. **Summary.** The eggs of 17 species from 12 genera of some Hadeninae from Ukraine (Noctuidae) are described and illustrated with using scanning electron microscopy. The diagnostic characters of genera and species are selected.

Keywords: Hadeninae, Noctuidae, Lepidoptera, egg, chorion, description, diagnostic characters, scanning electron microscopy.

Долинская И. В. Скульптура хориона яиц некоторых совок подсемейства Hadeninae (Lepidoptera, Noctuidae) фауны Украины. Резюме. С помощью сканирующего электронного микроскопа изучены и проиллюстрированы яйца 17 видов из 12 родов Hadeninae (Noctuidae) фауны Украины. Выделены диагностические признаки для родов и видов.

Ключевые слова: Hadeninae, Noctuidae, Lepidoptera, яйцо, хорион, описание, диагностические признаки, сканирующая электронная микроскопия.

Долинська І. В. Скульптура хоріону ясць деяких совок підродини Hadeninae (Lepidoptera, Noctuidae) фауни України. Резюме. За допомогою скануючого електронного мікроскопу вперше вивчено та проілюстровано яйця 17 видів з 12 родів Hadeninae (Noctuidae) фауни України. Висвітлено діагностичні ознаки для родів і видів.

Ключові слова: Hadeninae, Noctuidae, Lepidoptera, яйце, хоріон, опис, діагностичні ознаки, скануюча електронна мікроскопія.

Introduction

This work continues a series of articles concerning the morphology of eggs of noctuids from the fauna of Ukraine (Dolinskaya & Geryak, 2010). Subfamily contains 99 species of 32 genera in Ukraine (Klyuchko et al., 2001). Detailed line drawings illustrating the eggs of 48 European species of the subfamily Noctuinae were published by Döring (1955). A more thorough examination of the chorionic structure can be achieved with the use of SEM. Hinton (1981) illustrated the eggs of 5 European Hadeninae species. Sannino & Espinosa (1999) examined eggs of *Mamestra brassicae* Linnaeus from Italy. Salkeld (1984) described and illustrated the eggs of 26 Canadian Hadeninae species. The eggs of 4 Chilean species of Hadeninae were described and illustrated by Angulo & Olivares (1991) and Rodriguez & Angulo (2007).

Material and Methods

The work is based on the original materials collected by the author in Ukraine. The eggs were obtained from females captured in the field. The eggs of 6 species (*Orthosia cerasi* Fabricius, *O. cruda* Denis & Schiffermüller, *O. populeti* Fabricius, *O. gothica* Linnaeus, *Tholera decimalis* Poda and *Lacanobia w-latinum* Hufnagel) were kindly given by Yu. Geryak (State Natural History Museum, Lviv, Ukraine. The eggs were examined with the use of scanning electron microscopy (SEM).

The Hadeninae species have been determinated by Dr. A. Matov (Zoological Institut, St.Petersburg, Russia), Dr. Yu. Budashkin (Karadag Reserve,Crimea, Ukraine) and Mr. Yu. Geryak (State Natural History Museum, Lvov, Ukraine).

Terminology of the eggs according to E. Salkeld (1984). The systematic position of Noctuidae follows Fibiger & Hacker, 2004.

Descriptions

Orthosia cerasi (Fabricius, 1775).

Material. Ukraine, Zakarpatska Region, vic. Beregove, 28.03.2010 (Yu. Geryak).

Characteristics. Egg subspherical (Figs. 1, 2), height 0.5 mm, diameter 0.7 mm (n = 5). Fresh egg pale yellow. As egg develops, it becomes grey with black spot at apical part of egg.

Chorion not ridged. It is marked on two thirds surfaces by cells (longitudinal ridges weakly expressed (Fig. 2). Micropylar area conspicuous. Rosette with 8–11 petalled cells (Fig. 3). The rest cells rounded, with clearly expressed, strong ridges. Cells arranged by regular radial lines. The quantity of lines increases to egg base. Aeropyles clearly expressed at walls junctions (Fig. 4).

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***Orthosia cruda* ([Denis & Schiffermüller],1775)**

Material. Ukraine, Zakarpatska Region, vic. Beregove. 30.03.2010 (Yu. Geryak).

Characteristics. Egg subspherical, height 0.45–0.5 mm, diameter 0.7–0.8 mm (n = 5).

Distinctions from the previous species it is not recorded (Fig. 5).

***Orthosia populeti* (Fabricius, 1781)**

Material. Ukraine, Zakarpatska Region, vic. Beregove, 30.03.2010 (Yu. Geryak).

Characteristics. Egg subspherical, height 0.65–0.7 mm, diameter 0.9 mm (n = 5).

Distinctions from the previous species it is not recorded (Fig. 6).

***Orthosia gothica* (Linnaeus, 1758)**

Material. Ukraine, Zakarpatska Region, vic. Beregove. 30.03.2010 (Yu. Geryak).

Characteristics. Egg subspherical, height 0.55–0.6 mm, diameter 0.7–0.8 mm (n = 5).

Distinctions from the previous species it is not recorded (Figs. 7, 8, 9).

***Orthosia incerta* (Hufnagel, 1766)**

Material. Ukraine, Cherkaska Region, Kaniv Nature Reserve, 2009 (I. Dolinskaya).

Characteristics. Egg subspherical, diameter 0.6–0.8 mm (n = 5). Fresh egg pale yellow. As egg develops, it becomes grey-white with pale brown spot at micropylar area and pale brown stripe on perimeter apical part of egg. Before caterpillar emergence egg becoming taupe.

Remark. Longitudinal ridges much less distinct than at other species (Fig. 10).

***Egira conspicillaris* (Linnaeus, 1758)**

Material. Ukraine, Cherkaska Region, Kaniv Nature Reserve. 12.05.2009 (I. Dolinskaya).

Characteristics. Egg subspherical, height 0.4–0.45 mm, diameter 0.7–0.75 mm (n = 5). Fresh egg grey-white, then grey at micropylar area. Before caterpillar emergence egg becoming taupe.

Chorion not ridged. It is marked on two thirds surfaces by cells with weakly expressed longitudinal ridges (Fig. 11). Micropylar area conspicuous. Rosette with 12–13 petalled cells (Fig. 12). Secondary cells long and narrow. The rest cells clearly expressed, polygonal, short and broad. Cells arranged by regular radial lines. The quantity of lines increases to egg base. Aeropyles clearly expressed at walls junctions (Fig. 13).

Oviposition. Eggs laid in single-layer tight clusters where they pressed one to another.

***Tholera decimalis* (Poda, 1761)**

Material. Ukraine, Zakarpatska Region, Rakhiv District, vic. Lug, 17.09.2009 (Yu. Geryak).

Characteristics. Egg subspherical (Figs. 14–16), height 0.7–0.8 mm, diameter 0.9–1.0 mm (n = 5). Chorion white, translucent, micropylar area pale brown.

Chorion faintly ridged. It is marked on two thirds surfaces. Micropylar rosette with 17–19 long and narrow petalled cells and with 3–4 micropylar openings. Secondary cells long and narrow, very weakly expressed (Fig. 17). There are 20–2 longitudinal ridges, radiate from secondary cells. Columnar cells typical, broad and short with weakly expressed longitudinal ridges and transverse walls (Fig. 18). Along all surface of longitudinal ridges and transverse walls densely placed small aeropyles. Chorion wrinkled everywhere (Fig. 19).

***Anarta trifolii* (Hufnagel, 1766)**

Material. Ukraine, Crimea, Karadag Nature Reserve. 4.07.2006 (I. Dolinskaya); Cherkaska Region, Kaniv Nature Reserve, 28.05.2008, 4.05.2009 (I. Dolinskaya).

Characteristics. Egg subspherical (Fig. 20), height 0.5mm, diameter 0.6–0.8 mm (n =5).

Fresh egg pale citron colour. As egg develops, at micropylar area of egg appears vinous spot and the same stripe on perimeter apical part of egg. Before caterpillar emergence egg becoming taupe with brown spot at apical part of egg. Chorion white, translucent, white.

Chorion ridged. It is marked on two thirds surfaces. Micropylar rosette elevated with 15–19 long and narrow petalled cells with folded floors and with 6 micropylar openings. Secondary cells typical, long, narrow and pointed (Fig. 21). There are 14–18 of the 39–43 elevated, broad longitudinal ridges radiate from pointed outer ends of secondary cells. Transverse walls narrow, much less distinct that ridges. Aeropyles clearly expressed. Chorion sharply wrinkled everywhere (Fig. 22).

Oviposition. Eggs laid solitary.

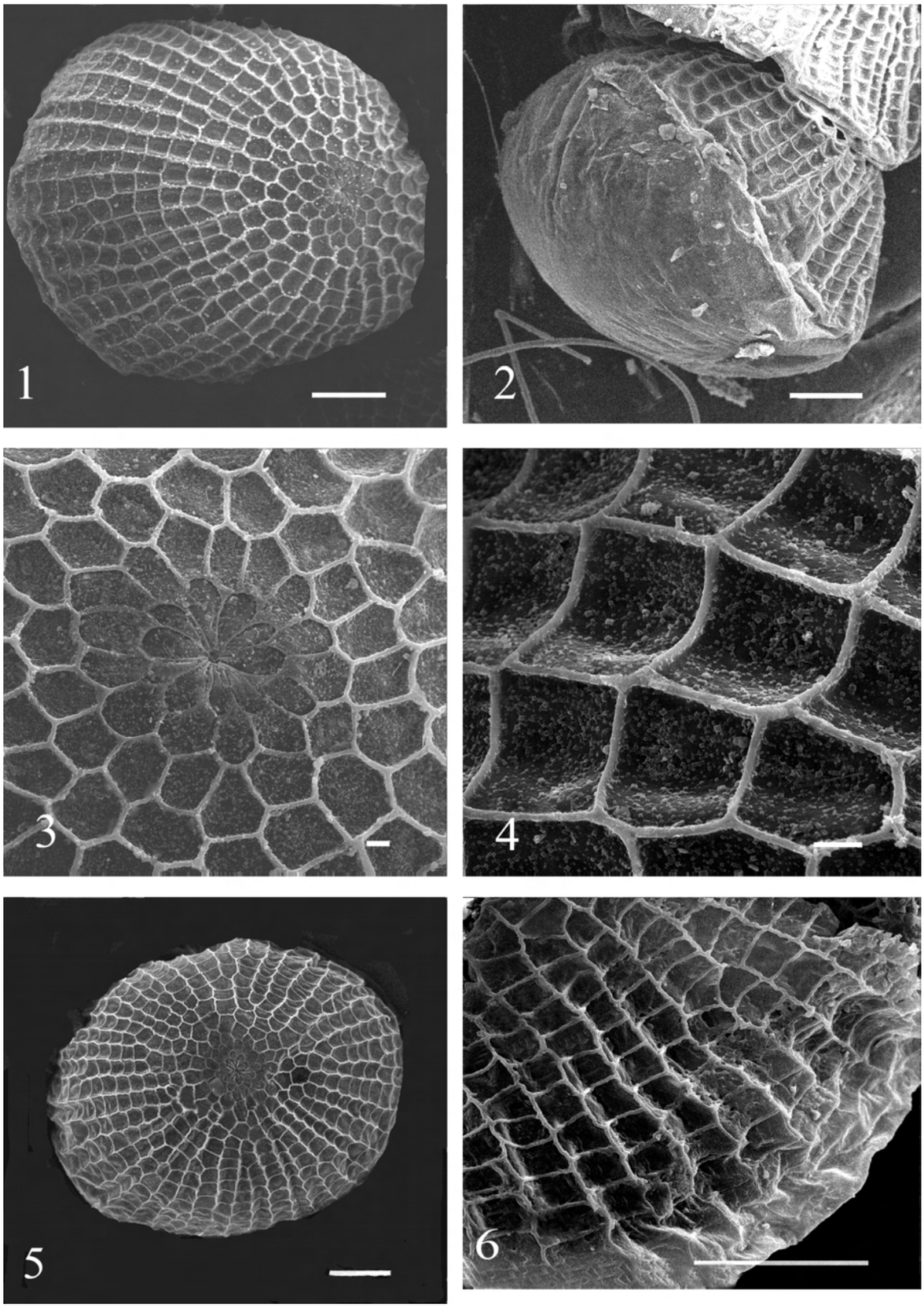
***Polia nebulosa* (Hufnagel, 1766)**

Material. Ukraine, Volynska Region, Lyubishevskiy District, vic. Svalovichi. 18.06.2005; Crimea, Karadag Nature Reserve. 21.06.2006 (I. Dolinskaya).

Characteristics. Egg subspherical (Fig. 23), height 0.65–0.7 mm, diameter 0.75–0.8 mm (n = 10). Fresh egg light green to white. As egg develops, it becomes light green to grey with grey spot at apical part of egg. Before caterpillar emergence egg becoming grey with black spot at apical part of egg (caterpillar). Chorion white, translucent.

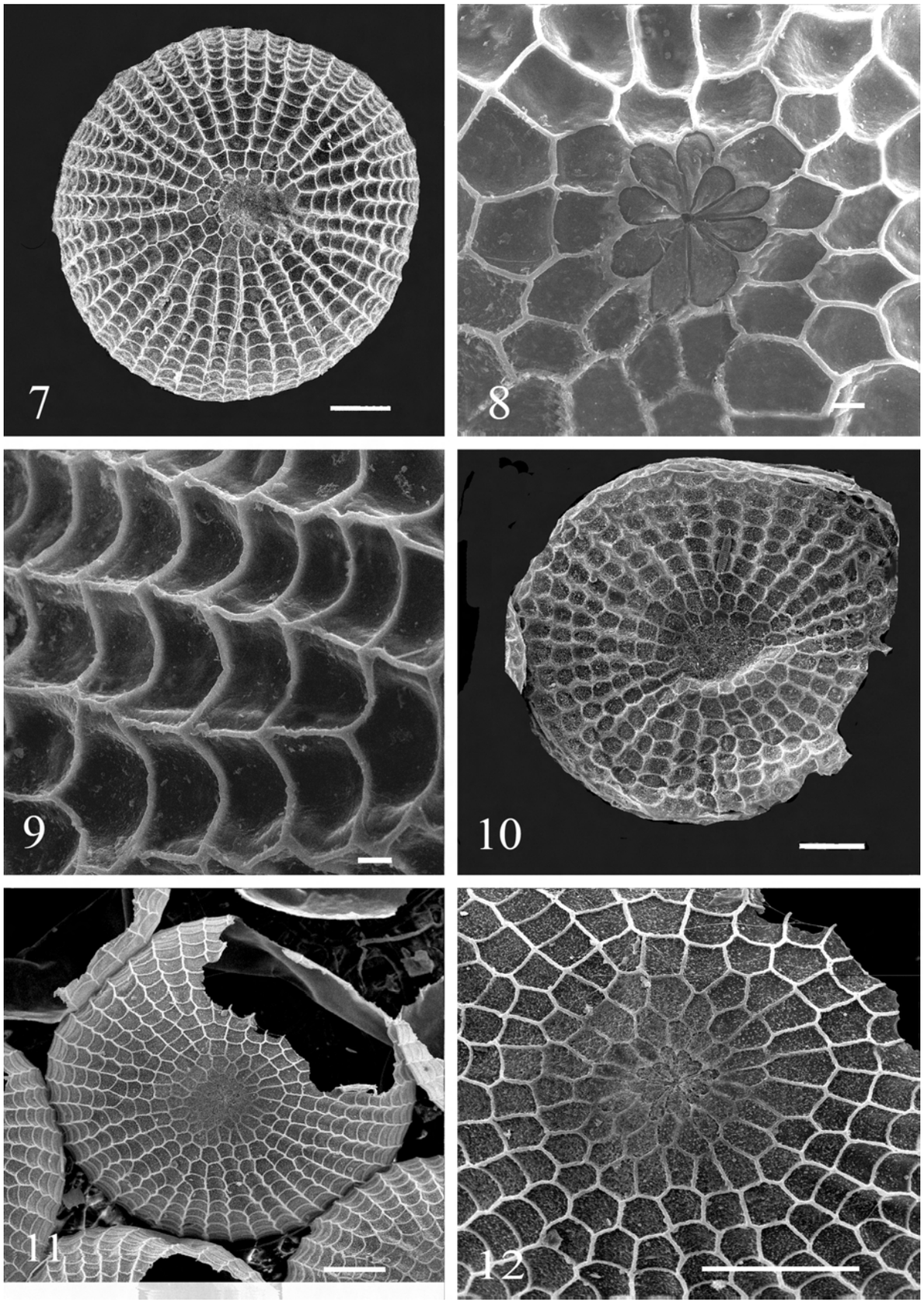
Chorion ridged. It is marked on two thirds surfaces. Micropylar rosette with 10–11 petalled cells and with 7 micropylar openings. Secondary cells polygonal. There are 11–13 of the 28–30 elevated longitudinal ridges radiate from outer ends of secondary cells. Transverse walls broad as ridges, but much less distinct than ridges. Aeropyles slightly expressed. Cells have smooth floors (Fig. 24).

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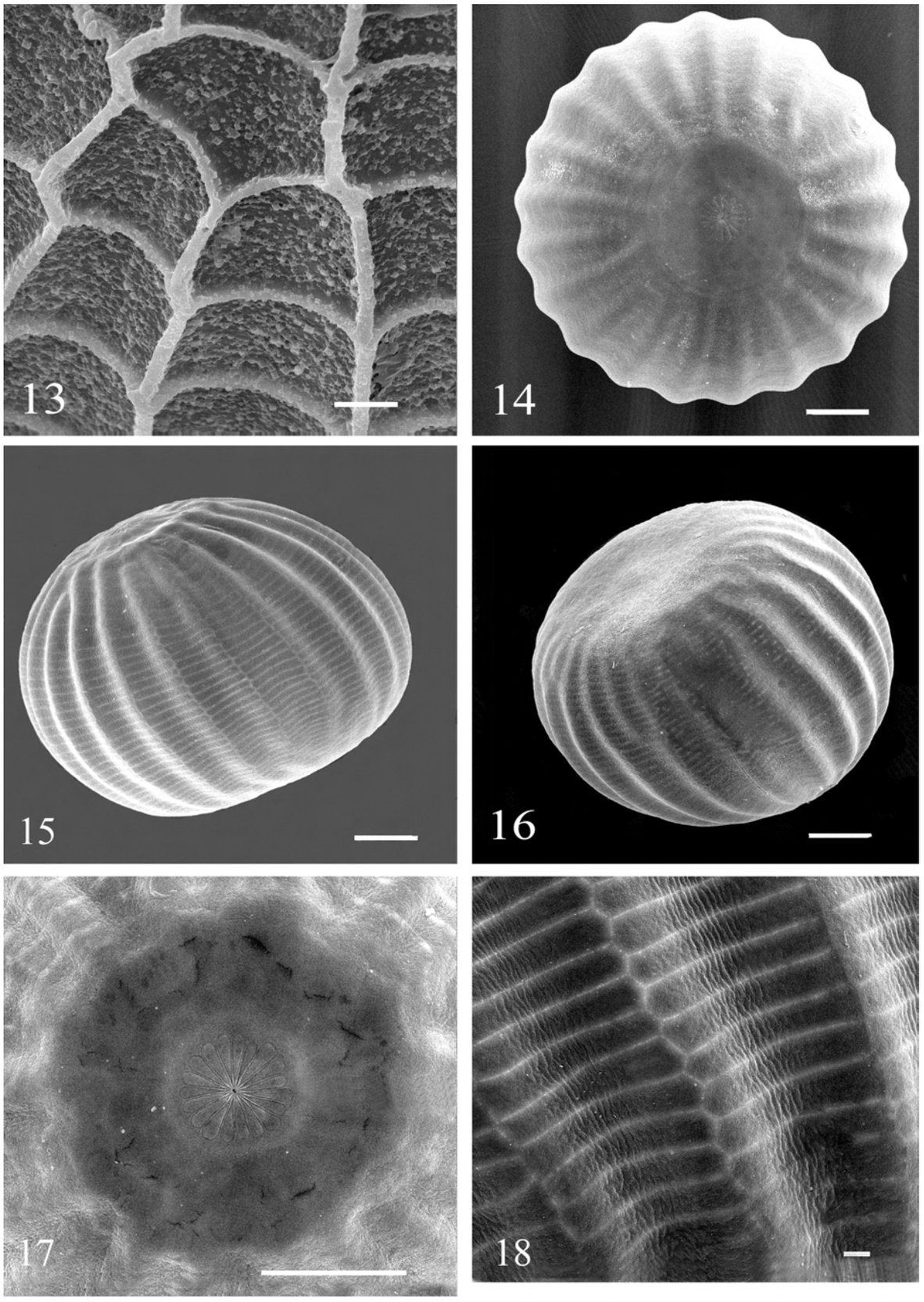
Figs. 1–6. Eggs of Hadeninae: 1–4. *Orthosia cerasi*. 5. *Orthosia cruda*. 6. *Orthosia populeti*.
Scale: 100 μ (1, 2, 5, 6); 10 μ (3, 4).

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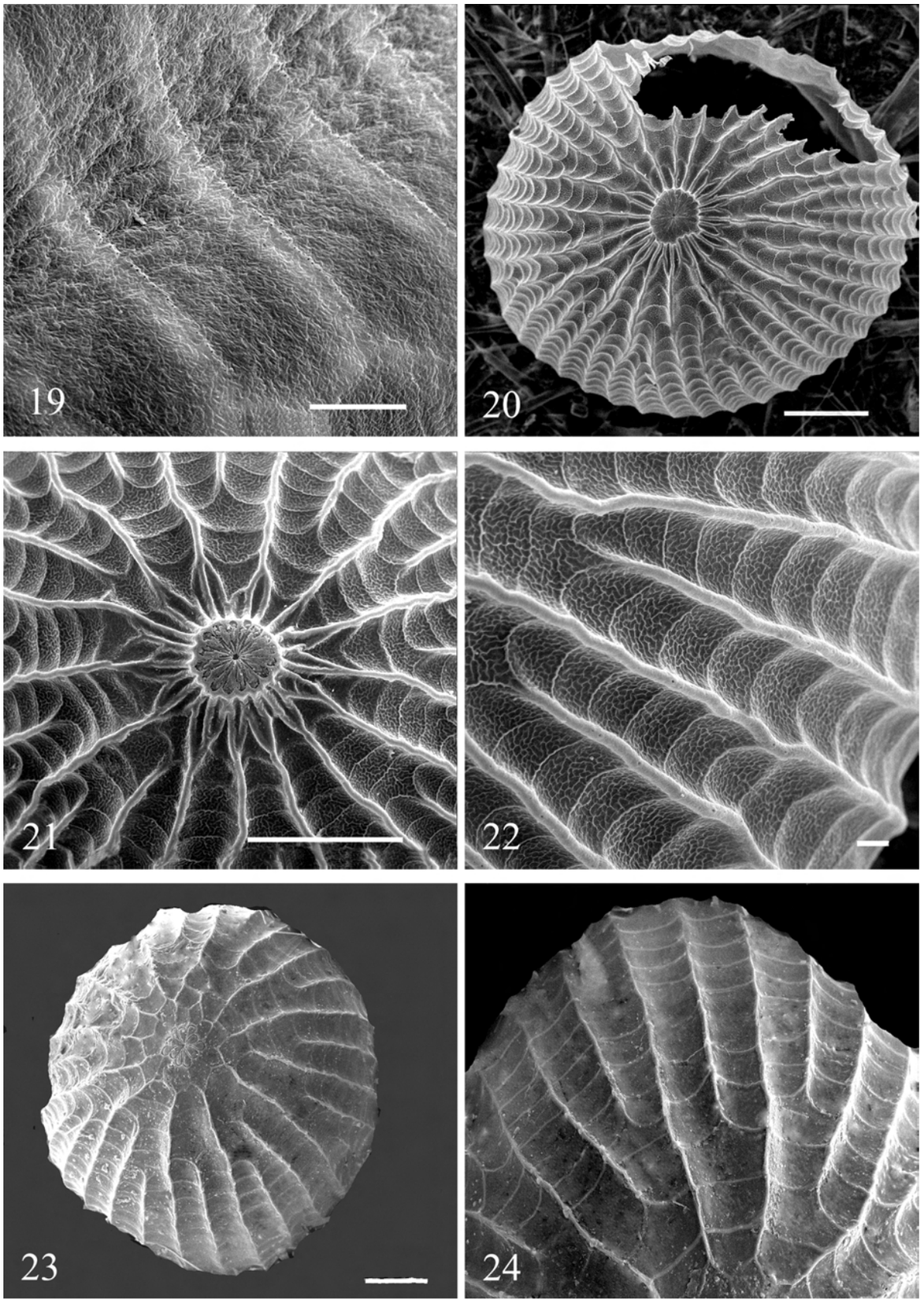
Figs. 7–12. Eggs of Hadeninae: 7–9. *Orthosia gothica*; 10. *Orthosia incerta*; 11–12. *Egira conspicillaris*.
Scale: 100 μ(7, 10–12); 10 μ (8, 9).

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Figs. 13–18. Eggs of Hadeninae: 13. *Egira conspicillaris*; 14–18. *Tholera decimalis*.
Scale: 100 μ(13–17); 10 μ (18).

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Figs. 19–24. Eggs of Hadeninae: 19. *Tholera decimalis*; 20–22. *Anarta trifolii*; 23–24. *Polia nebulosa*.
Scale: 10 μ (19, 22); 100 μ(20, 21, 23–24).

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Oviposition. Eggs laid in single-layer tight clusters where they pressed one to another.

Lacanobia thalassina (Hufnagel, 1766)

Material. Ukraine, Cherkaska Region, Kaniv Nature Reserve. 18.08.2005 (I. Dolinskaya).

Characteristics. Egg subspherica, height 0.5–0.6 mm, diameter 0.6–0.7 mm (n = 5). Fresh egg pale yellow. Before caterpillar emergence egg becoming purple.

Chorion not ridged. It is marked on anterior half of egg by cells (longitudinal ridges indistinct expressed) and smoothed on the remaining surface (Fig. 25). Micropylar rosette with 16–18 long and narrow petalled cells and with 5–7 micropylar openings. Secondary cells long, polygonal (Fig. 26). Cell remaining egg surface short and broad. Aeropyles slightly expressed. Cells have smooth floors (Fig. 27).

Oviposition. Eggs laid in single-layer tight clusters where they pressed one to another.

Lacanobia w-latinum (Hufnagel, 1766)

Material. Ukraine, Dnipropetrovska Region. 2.07.2002 (Yu. Geryak).

Characteristics. Egg subspherical, height 0.55mm, diameter 0.7mm (n = 5). Chorion sculpture as like as previous species (Fig. 28) but the cells of micropylar rosette with folded floors (Fig. 29).

Oviposition. Eggs laid in single-layer tight clusters where they pressed one to another.

Hada plebeja (Linnaeus, 1761)

Material. Ukraine, Volynska Region, Lyubishevskiy District, vic. Svalovichi. 16.06.2005 (I. Dolinskaya).

Characteristics. Egg subspherical (Fig. 30), height 0.4–0.5 mm, diameter 0.5–0.8 mm (n = 5). Fresh egg pale yellow. As egg develops, it becomes pale brown and then brown. Хорион полупрозрачный.

Chorion ridged. It is marked on two thirds surfaces (Fig. 31). Micropylar rosette conspicuous, elevated with 16–19 long and narrow petalled cells, which have folded floors. Secondary cells slightly expressed, long and narrow (Fig. 32). There are 12 of the 41–44 longitudinal ridges radiate from outer ends of secondary cells. Transverse walls unmarked on anterior quarter of egg and slightly expressed on remaining egg surface. Longitudinal ridges elevated, broad, conspicuous. Aeropyles slightly expressed (Fig. 33).

Mamestra brassicae (Linnaeus, 1758)

Material. Ukraine, Cherkaska Region, Kaniv Nature Reserve. 13.08.2005 (I. Dolinskaya).

Characteristics. Egg subspherical (Fig. 34), height 0.5mm, diameter 0.5–0.9 mm (n = 5). Fresh egg pale yellow. As egg develops, it becomes brown- yellow. Before caterpillar emergence egg becoming taupe or black. Chorion white, translucent.

Chorion ridged. It is marked on two thirds surfaces. Micropylar rosette conspicuous, elevated with 11–15 petalled cells and with 5 micropylar openings. The cells floors folded. Secondary cells slightly expressed, long and narrow. There are 13–15 of the 34–37 longitudinal ridges radiate from outer ends of secondary cells. Longitudinal ridges elevated, broad, slightly wavy. Transverse walls filiform, clearly expressed, especially in area of 2–8 series of cells, much less distinct that ridges (Fig. 35). Aeropyles slightly expressed. Chorion wrinkled everywhere (Fig. 36).

Oviposition. Eggs laid in single-layer tight clusters where they pressed one to another.

Sideridis turbida (Esper, 1790)

Material. Ukraine, Volynska Region, Lyubishevskiy District, vic. Svalovichi. 15.06.2005 (I. Dolinskaya).

Characteristics. Egg subspherical (Fig. 37), height 0.4 mm, diameter 0.6–0.7 mm (n = 5). Fresh egg pale yellow. As egg develops, it becomes pale brown with pale pink tint. Before caterpillar emergence egg becoming brown (caterpillar). Chorion white, translucent.

Chorion ridged. It is marked on two thirds surfaces. Micropylar rosette elevated, conspicuous, with 13–16 long and narrow petalled cells and with 4–5 micropylar openings. Base of cells convex in the middle and concave near walls (Fig. 38). Secondary cells indistinct, long and narrow. There are 11–13 of the 32–35 broad longitudinal ridges radiate from outer ends of secondary cells. Transverse walls filiform, much less distinct that ridges (Fig. 39). Aeropyles clearly expressed. Chorion wrinkled everywhere (Fig. 40).

Oviposition. Eggs laid as one-layered line bands (10–15 eggs), where they tightly pressed one to other.

Conisania luteago ([Denis & Schiffermüller], 1775)

Material. Ukraine, Crimea, Karadag Nature Reserve. 15.07.2006 (I. Dolinskaya).

Characteristics. Egg subspherical (Fig. 41), height 0.7–0.8 mm, diameter 0.9–1.0 mm (n = 2). Fresh egg white, then it becomes pale citron colour. Before caterpillar emergence egg becoming grey with purple–grey spot at apical part og egg. Chorion translucent, white with pale brown micropylar area.

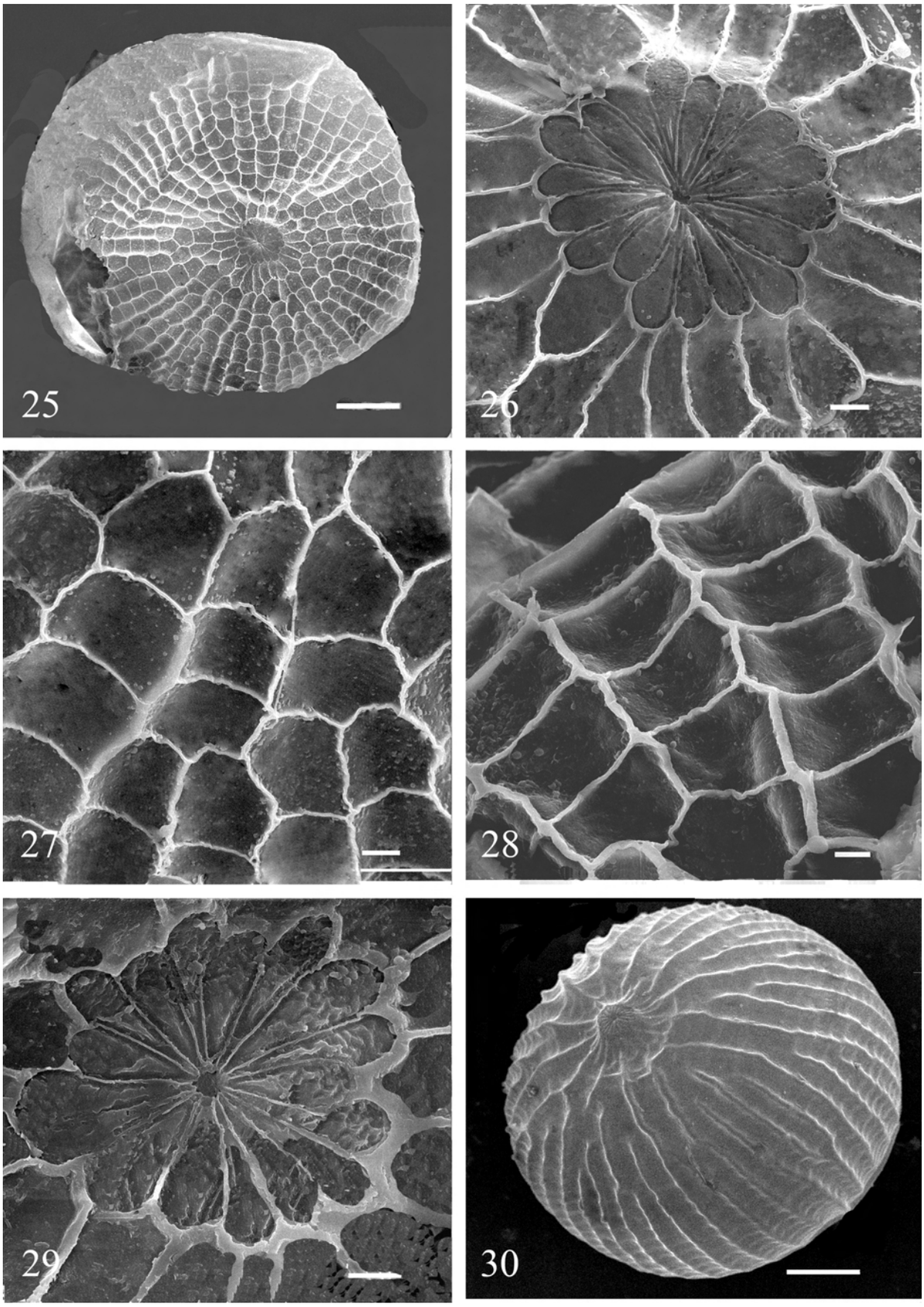
Chorion ridged-cellular. Apical third of egg cellular and remaining ridged. Micropylar rosette with 13–14 petalled. Cells apical third of eggs arranged irregularly on chorion, various under the form and size (Fig. 42). Remaining egg surface looks like narrow and long columnar cells with conspicuous longitudinal ridges. Aeropyles slightly expressed (Fig. 43).

Oviposition. Eggs laid solitary.

Mythimna albipuncta ([Denis & Schiffermüller], 1775)

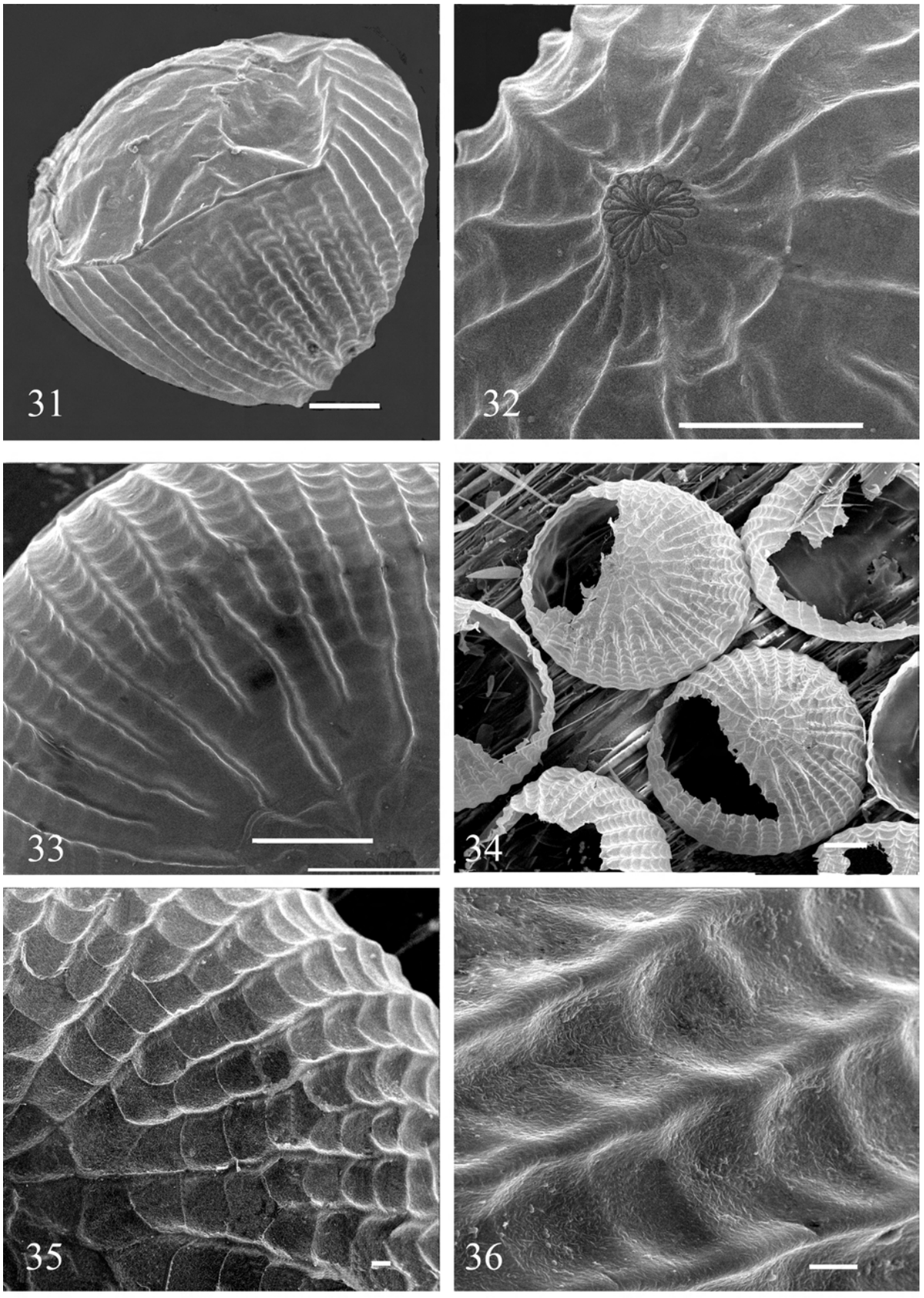
Material. Ukraine, Cherkaska Region, Kaniv Nature Reserve. 19.08. 2005 (I. Dolinskaya).

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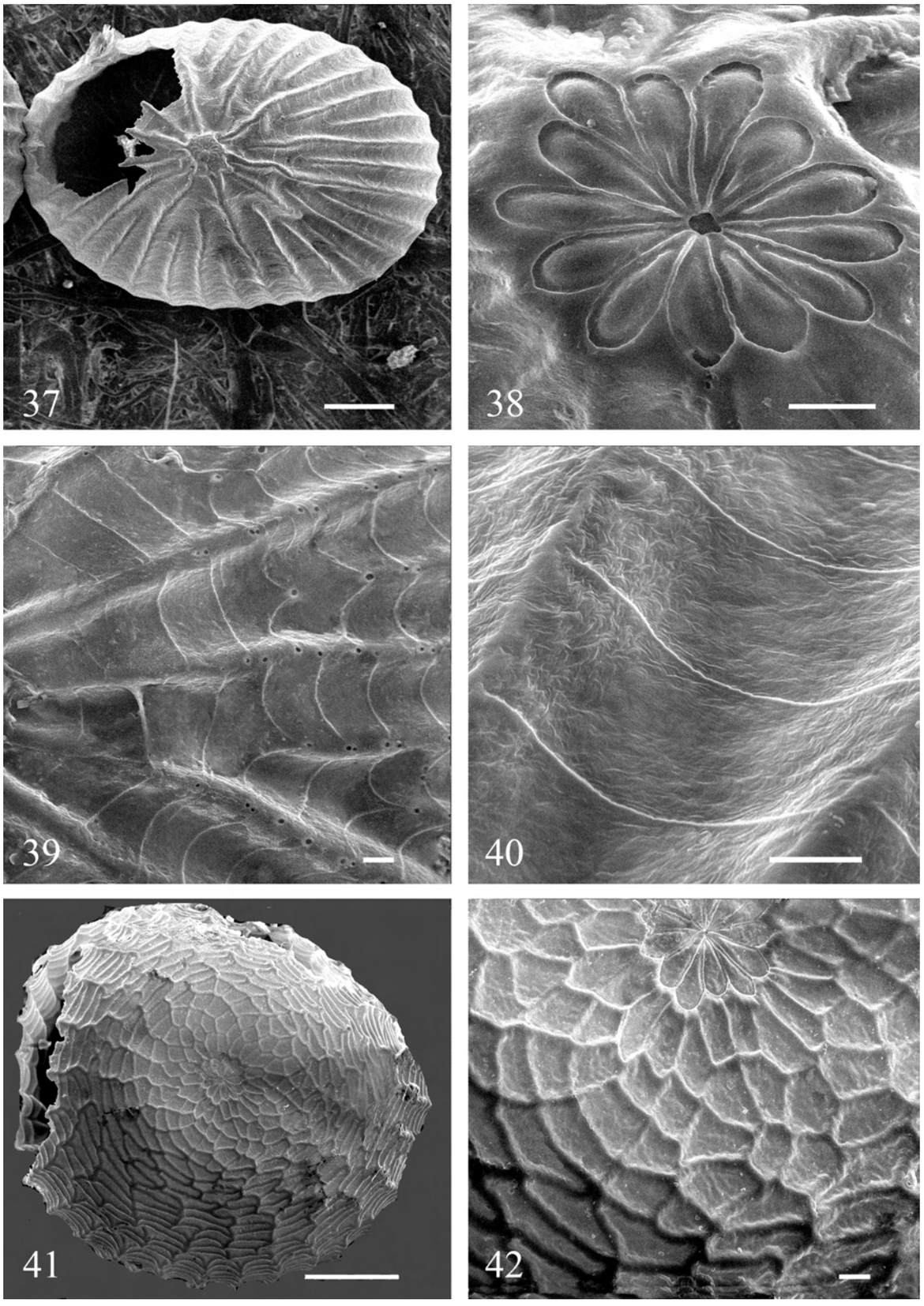
Figs. 25–30. Eggs of Hadeninae: 25–27. *Lacanobia thalassina*; 28–29. *Lacanobia w-latinum*; 30. *Hada plebeja.*
Scale: 100 μ(25, 30); 10 μ (26–29).

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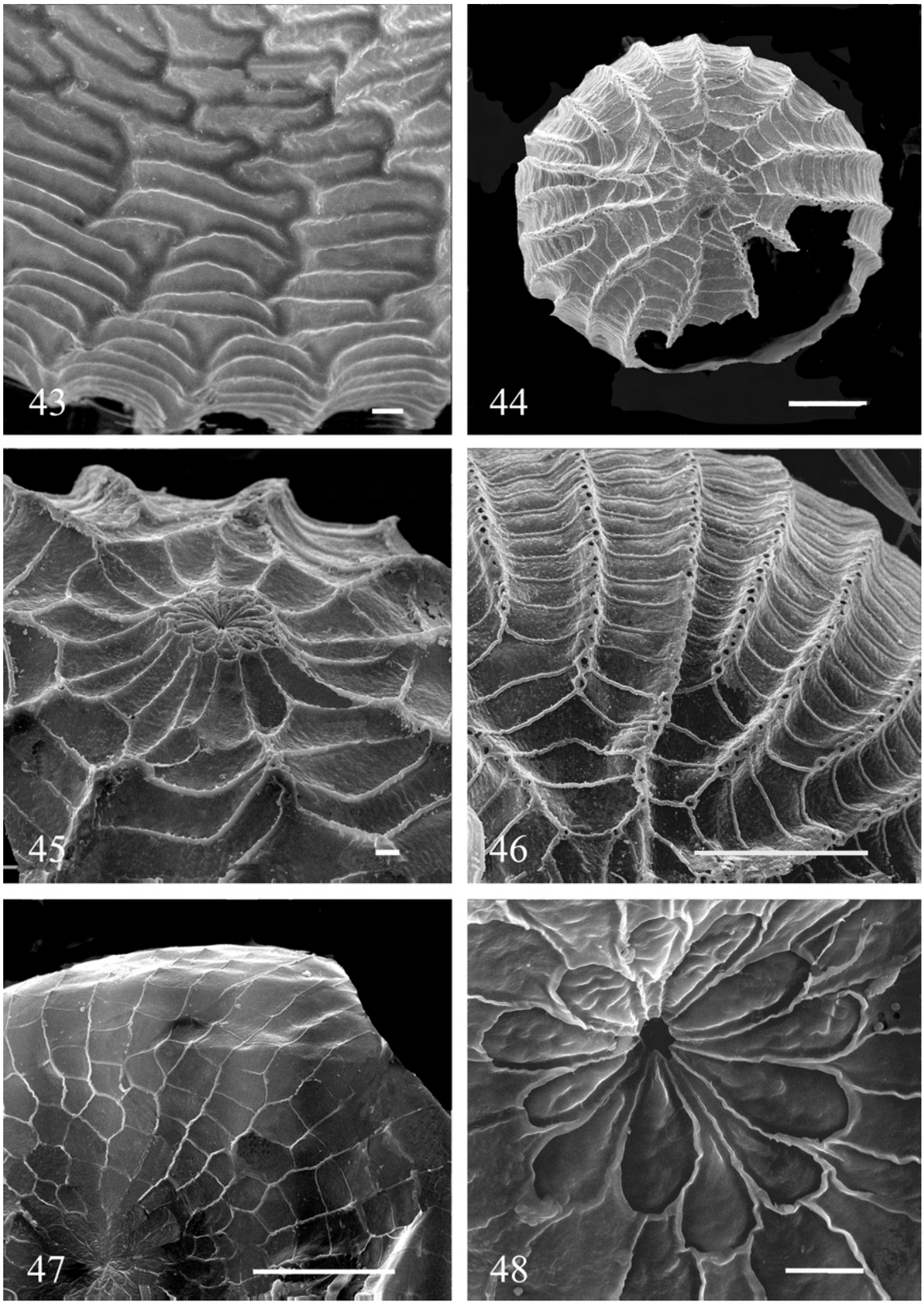
Figs. 31–36. Eggs of Hadeninae: 31–33. *Hada plebeja*; 34–36. *Mamestra brassicae*.
Scale: 100 μ(32–34); 10 μ (31, 35–36).

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Figs. 37–42. Eggs of Hadeninae: 37–40. *Sideridis turbida*; 41–42. *Conisania luteago*.
Scale: 100 μ(37, 41); 10 μ (38–40, 42).

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Figs. 43–48. Eggs of Hadeninae: 43. *Conisania luteago*; 44–46. *Mythimna albipuncta*; 47–48. *Leucania obsolete*. Scale: 100 μ(43, 44, 46, 47); 10 μ (45, 48).

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Characteristics. Egg subspherical (Fig. 44), diameter 0.6–0.7 mm (n = 5). Fresh egg yellow –white.

Chorion ridged. It is marked on two thirds surfaces. Micropylar rosette elevated, with 13–14 petalled cells. Base of cells convex in the middle and concave near walls. Secondary cells typical, long, narrow and pointed (Fig. 45). There are 10–11 of the 24 elevated longitudinal ridges radiate from pointed ends of secondary cells. Along all surface of longitudinal ridges densely placed aeropyles with large roller-like edges (Fig. 46). Transverse walls narrow, much less distinct that ridges. Collumnsr cells broad and short.

Oviposition. Eggs laid in single-layer tight clusters where they pressed one to another.

Remark. Secondary cells similar to *Anarta trifolii*.

Leucania obsoleta (Hübner, 1803)

Material. Ukraine, Crimea, Karadag Nature Reserve. 15.06.2006 (I. Dolinskaya).

Characteristics. Egg semi-oval, diameter 0.7 mm (n = 5). Fresh egg pale yellow. In three days after laying egg becomes citron colour. Before caterpillar emergence egg becoming grey. Chorion white, transparent.

Chorion not ridged. It is marked on anterior quarter of egg by cells and smoothed on the remaining surface (Figs. 47, 48). Micropylar rosette with 10–12 long and narrow petalled cells. Base of cells convex in the middle and concave near walls (рис.49). Cells of 5–7 series short and broad with folded floors and narrow walls. Cells arranged by regular radial lines. Aeropyles slightly expressed.

Oviposition. Eggs are laid by clusters, are disposed chaotically one on the other.

Discussion

Based on the data above, the three types of sculpture, cellular, ridged-cellular and ridged, are typical for studied species of the subfamily Hadeninae.

Cellular sculpture is typical for species from four studied genera, *Orthosia cerasi*, *O. cruda*, *O. populeti, O. gothica, O. incerta*, *Egira conspicillaris*, *Lacanobia thalassina*, *L. w-latinum* and *Leucania obsolete*.

Cellular sculpture marked either on two thirds surface (*Egira conspicillaris,* species from genus *Orthosia*), or on anterior quarter — anterior half of egg surface. *Leucania obsolete*, species from genus *Lacanobia*).

There are no differences between *Egira conspicillaris* and species genus *Orthosia*.

Leucania obsolete sculpture in form 7–8 series of cells. Micropylar rosette with 10–12 cells.

Lacanobia thalassina and *L. w-latinum* in form 12–14 series of cells. Micropylar rosette with 16–18 cells.

Ridged-cellular sculpture is typical for species *Conisania luteago.* Apical third of egg cellular and remaining ridged.

Ridged sculpture is typical for species from seven studied genera — *Tholera decimalis*, *Anarta trifolii*, *Polia nebulosa*, *Hada plebeja*, *Mamestra brassicae*, *Sideridis turbida* and *Mythimna albipuncta*.

Hada plebeja. Transverse walls unmarked on anterior quarter of egg and slightly expressed on remaining egg surface.

Mamestra brassicae. Transverse walls filiform and clearly expressed in area of 2–8 series of cells. On remaining egg surface they more broad and diffuse.

Sideridis turbida. Transverse walls filiform, conspicuous.

Tholera decimalis. Sculpture weakly expressed. Columnar cells are typical — broad and short. Along all surface of longitudinal ridges and transverse walls densely placed small aeropyles

Anarta trifolii and *Mythimna albipuncta*. Secondary cells are typical, long, narrow and pointed. However every species have typical diagnostic characters.

A*narta trifolii.* There are 14–18 of the 39–43 longitudinal ridges radiate from secondary cells. Chorion sharply wrinkled everywhere.

Mythimna albipuncta. There are 10–11 of the 24 longitudinal ridges radiate from secondary cells. Along all surface of longitudinal ridges densely placed aeropyles with large roller-like edges.

Polia nebulosa. Transverse walls broad as ridges, but much less distinct than ridges.

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